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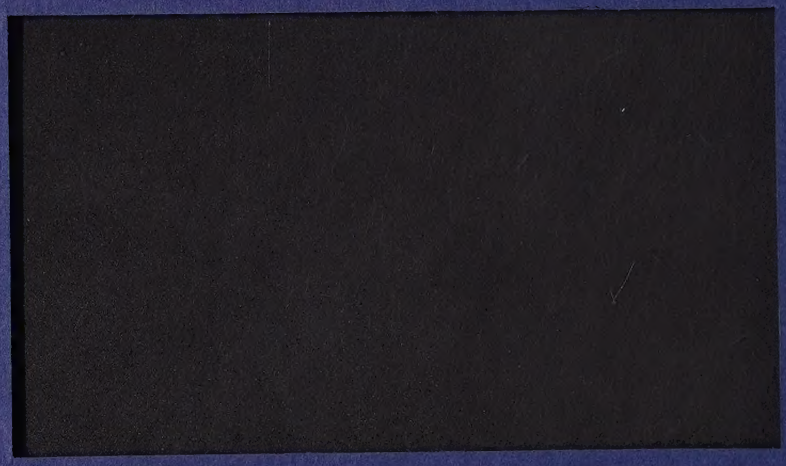

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Redifon

TECHNICAL DATA

HANDBOOK

- for -

TWO-TONE KEYER/CONVERTER TYPE GK.189

(from Serial No.65)

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SAFETY FIRST

Operation of electronic equipment involves the use of dangerous voltages. Operating personnel must at all times observe safety regulations. Do not change valves or make adjustments inside the equipment with the power supply on. Do not depend upon interlock switches for protection but always cut off the power supply before removing covers or other protective devices. Under certain conditions, dangerous potentials may exist in circuits with power controls in the off position, due to charges retained by capacitors. To avoid possible danger, always disconnect power, then earth circuits prior to touching them.

Although every practicable safety precaution has been incorporated in this equipment the following rules must be strictly observed:

KEEP AWAY FROM LIVE CIRCUITS. Under no circumstances should any person be permitted to reach within or in any manner gain access to any enclosure with power supply line switches to the equipment closed, or with interlock switches closed; or to connect any apparatus external to the enclosure to circuits within the equipment. Wherever feasible when testing circuits check for continuity and resistance rather than directly checking voltage at various points.

DON'T SERVICE OR ADJUST ALONE. Under no circumstances should any person reach within a unit for the purpose of servicing or adjusting the equipment without the immediate presence or assistance of another person capable of rendering aid.

DON'T TAMPER WITH INTERLOCKS. Under no circumstances should any interlock switch be removed, short circuited, or tampered with in any way by other than authorized maintenance personnel; nor should reliance be placed upon the interlock switches for removing voltages from the equipment.

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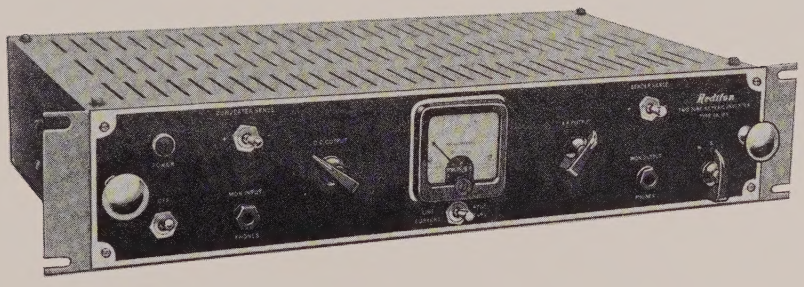

REDIFON TYPE GK.189

TWO-TONE KEYER/CONVERTER

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Components Lists:-

Title	Ref. No.	Sheets
GK. 189	WDB/6164	2 - 6
A. C. Power Unit for GK. 189A	WD1/6165	2, 3
12 Volt D. C. Power Unit for GK. 189B	WD1/6166	2
24 Volt D. C. Power Unit for GK. 189C	WD1/6167	2, 3

DRAWINGS

Title	Drawing No.
Circuit Diagrams:-	
GK.189	WDB/6164
A.C. Power Unit for GK.189A	WD1/6165
12 Volt D.C. Power Unit for GK.189B	WD1/6166
24 Volt D.C. Power Unit for GK.189C	WD1/6167
Teleprinter Connections to provide Local Record	SK.4192/S

1.0

INTRODUCTION

The Redifon GK.189 is a two-tone keyer/converter unit intended to perform two functions, namely:-

(a) To convert d.c. impulses from a teleprinter into two separate tones, representing mark and space conditions respectively, for either line or radio transmission, and

(b) To convert tone signals received by line or radio into d.c. impulses to operate a teleprinter.

The equipment comprises three sub-units, namely a tone sender, a tone converter, and a power unit, which are all mounted on a common chassis designed for standard 19 in. rack mounting.

The sender and converter circuits are quite independent and may be operated simultaneously.

Three types of power unit are available, for operation from either 100-125 or 200-250 volts, 50/60 c/s a.c., 12 volts d.c., or 24 volts d.c. The equipments are designated type numbers GK.189A, GK.189B, and GK.189C respectively, according to the type of power unit incorporated. They are in all other respects identical.

The equipment is fully transistorised, resulting in economy of power consumption and a high standard of efficiency and reliability under extremely diverse climatic conditions. It is also fully tropicalised and may be operated safely in ambient temperatures up to 50°C.

2.0

SUMMARY OF DATA

Keying Input to Tone Sender:-	± 10 to ± 80 volts d.c., single or double current, or relay contacts.
Audio Frequency Output from Tone Sender and Input to Tone Converter:-	2000 and 2400 c/s ± 150 c/s.
Tone Sender Output Level:-	-20 to +3 dbm.
Tone Converter Input Level:-	-20 to +10 dbm.
D.C. Output from Tone Converter:-	35 to 50 mA; open circuit voltage, 200.
Keying Speed:-	75 bauds maximum.
Monitoring Facilities:-	Headphone monitoring of tone sender output and tone converter input. Meter monitoring of tone converter input and output.

Transistor Complement:-

Function and Circuit Ref.	Type
Two tone trigger (VT1, VT2)	OC71
Tone oscillator (VT3)	OC71
Tone output (VT4)	OC71
Converter input amplifier (VT5)	OC71
Monitor amplifier (VT6)	OC71
D.C. amplifier (VT7)	OC71
Converter trigger (VT8, VT9)	OC76
Converter oscillator (VT10, VT11)	OC35
Converter clipper (VT12)	OC71
Bias amplifier (VT13)	OC71
Bias amplifier emitter follower (VT14)	GET.103

24 Volt D.C. Power Unit (GK.189C):-

Low impedance voltage control (VT1)	OC76
Emitter follower output (VT2)	OC35

A neon stabiliser type 75C1 (CV4084) is also employed - as an electronic switch in the tone converter output circuit, but located on the power unit sub-chassis.

Controls:-

Power switch and indicator lamp (S5, LP1)
Tone Converter Sense switch (S3)
Tone Sender Sense switch (S2)
D. C. Output Level control (RV2)
A. F. Output Level control (RV1)
Line Current/Input Level meter switch (S4)
Mark/Space/Line selector (S1)

Power Supply:-

GK. 189A - 100-125 or 200-250 volts, 50/60 c/s.
GK. 189B - 12 volts d. c.
GK. 189C - 24 volts d. c.

Power Consumption:-

GK. 189A - 20 watts
GK. 189B - 13 watts
GK. 189C - 29 watts

Dimensions and Weight:-

Width	-	19 in.	(48 cm.)
Height	-	$3\frac{1}{2}$ in.	(9 cm.)
Depth	-	12 in.	(30 cm.)

Weight:-	GK. 189A	-	18 lb. (8 kg.)
	GK. 189B	-	14 lb. (6 kg.)
	GK. 189C	-	14 lb. (6 kg.)

3.0

TECHNICAL DESCRIPTION

3.1 TONE SENDER

A transistor oscillator VT3 operates at a nominal basic frequency of 2400 c/s as determined by the resonant frequency of the tuned circuit comprising L1, C3, C4, C5, C6, C7, and C32.

By imposing a low impedance across C32, the effective capacitance of the tuned circuit is increased. The component values are so chosen that the frequency decreases to a nominal 2000 c/s.

This change is achieved by a bi-stable trigger circuit comprising VT1 and VT2, operated by either a keyed d.c. supply of $\pm$ 10 to $\pm$ 80 volts (single or double current) from a teleprinter or by a pair of relay contacts.

Germanium diodes MR1 and MR2 are provided to limit the input signal and prevent any excessive input voltages which might cause damage to the transistors.

A further germanium diode, MR8, in conjunction with R53 and C33, limits transient amplitude peaks which are otherwise liable to occur when the frequency is switched.

The Sense switch S2 enables either output tone to be associated with the mark or the space input condition, as required.

Switch S1 is in effect an operate/test switch providing for a continuous mark or space condition, or the incoming line signal, to be selected, as required.

The output from the oscillator is taken from the tuned circuit via an A.F. Output level control RV1 and is amplified by VT4.

3.2 TONE CONVERTER

The high-pass filter comprising C12, C13, C14, and L2 in the input to VT5 has a cut-off frequency of 1500 c/s in order to suppress any sub-harmonics of 2000 c/s or 2400 c/s which may be present in the input signal and would result in unwanted output from the discriminator.

VT5 is a limiting amplifier providing a signal of constant level to the discriminator circuit comprising the tuned secondary windings of two transformers T2 and T3 resonating at 1850 c/s and 2550 c/s respectively, and the two germanium diodes MR3 and MR4, giving d.c. output voltages corresponding to the two separate input tones.

The Sense switch S3 enables either output voltage to be associated with either input tone, as required.

VT12 is a clipper to augment the limiting action of VT5, so as to improve the operation of the tone converter at poor signal-to-noise ratios.

The d.c. pulses are fed to the base of an emitter follower transistor VT7, providing a low impedance output to operate a bistable trigger circuit comprising VT8 and VT9, which in turn keys a push-pull square wave oscillator employing transistors VT10 and VT11 producing approximately 24 volts peak-to-peak. The output transformer T5 has a voltage step-up ratio of about 4:1 and the output is rectified by the voltage doubling germanium diodes MR5, MR6, to provide a nominal 200 volts off-load keyed d.c. voltage which is fed via the D.C. Output level control RV2 and a series neon lamp to the teleprinter.

A portion of the output from the tone oscillator (VT3) in the tone sender circuit is fed to an amplifier VT13, feeding an emitter follower VT14 which in turn feeds a voltage doubling rectifier (MR9 and MR10) to provide a positive bias voltage. This voltage is applied via R43, VT9 when conducting, and R46, to the base winding of T5, thus ensuring that the square wave oscillator is held in the cut-off condition.

VT6 provides amplification of the input tone signals and feeds a half-wave rectifying circuit employing a germanium diode MR7 to give an input level indication on the meter M1. This meter may also be switched by S4 to indicate, in conjunction with a shunt resistor R49, the output line current.

3.3 PROVISION OF LOCAL RECORD (See Drg. SK.4192/S)

Some teleprinters are designed to produce a local record mechanically when the keyboard is operated, but others will only produce a local record by operation of the receiving electromagnet. The GK.189 incorporates a means of energising the electromagnet so as to produce a local record when using any teleprinter which includes a built-in send/receive relay as well as the mark/space send contacts.

When one of the teleprinter keys is depressed the send/receive relay is moved mechanically to the send position and stays there for the duration of the character being transmitted. Connections 11 and 12 on the GK.189 are therefore shorted (possibly via a small value of resistance and inductance in the teleprinter wiring) and effectively a resistance of a little over 1000 ohms is connected between the junction of R46/R47 and the -12 V line. This triggers the square wave oscillator VT10/VT11 and a d.c. supply is available at connections 5 and 6 to energise the teleprinter receiving electromagnet coil. This circuit is interrupted by the tongue and mark send contacts in accordance with the code of the character being transmitted so that the teleprinter will print a local record.

3.4 A.C. POWER UNIT (GK.189A)

Two separate full-wave metal rectifier circuits are employed. MR12 and MR13 provide a 12 volts negative supply for the square wave oscillator (VT10 and VT11) in the tone converter via the "A" line. MR14 and MR15 provide all other 12 volts negative supplies via the "B" and "C" lines. These separate rectifying circuits are necessary to reduce voltage fluctuations on the "B" and "C" lines due to large current variations in the "A" line.

The "D" line is the common positive (zero voltage) level.

The "E" line provides an a.c. supply of approximately 12 volts for the Power On indicator lamp.

3.5 12 VOLT D.C. POWER UNIT (GK.189B)

The load is divided between the three lines "A", "B", and "C"; the series resistors R61 and R62, in conjunction with the smoothing capacitor C40, ensure that any large current variations in one line do not cause voltage fluctuations on the other lines.

The circuits served by the various supply lines are the same as for the a.c. power unit, except that the "E" line supply for the Power On indicator lamp is, of course, d.c. instead of a.c.

The series rectifier MR12 serves merely to prevent the possibility of damage being caused to transistors in the event of the input polarity being inadvertently reversed.

3.6 24 VOLT D.C. POWER UNIT (GK.189C)

The two emitter followers VT1 and VT2 constitute a voltage stabilising system. The potential divider comprising R64 and R65 across the 24 volts input provides a reference at approximately 12 volts negative to the base of the low impedance voltage controller VT1. The output impedance of an emitter follower is somewhat lower than the base input impedance, but as the input impedance to VT1 is fairly high, the output impedance is further reduced by VT2 resulting in improved regulation.

In all other respects this power unit is similar to the 12 volt d.c. version.

4.0

OPERATION

4.1 INSTALLATION

Always ensure that adequate space is left above and below the unit to permit a free flow of cooling air through the ventilation louvres in the top and bottom of the protective cover.

In the case of the a.c. mains version (GK.189A), the input taps on the transformer in the power unit must be set for the available supply voltage. The two primary windings are arranged in parallel for 100-125 volts and in series for 200-250 volts.

Fuses of the correct value, as indicated on the circuit diagram for the appropriate power unit, must be fitted. These are of the glass cartridge type in screw-in holders mounted on the rear skirt of the chassis.

Details of all input and output connections are shown on the circuit diagram. The power supply connections are made via a three-pin socket to engage with plug PL1 mounted on the rear of the chassis. All other connections are made via a twelve-way terminal strip, the appropriate connections and terminal numbers, which are shown on the circuit diagram, being similarly identified on the equipment.

The appropriate connections between the GK.189 and the teleprinter to provide for the printing of a local record during transmission, are shown in Drawing No. SK.4192/S.

It is possible that the d.c. output from the GK.189 tone converter (connections 5 and 6) may have to be reversed; this depends on the windings of the receiving electromagnet in the teleprinter. These connections should be arranged so that when the coil is energised the armature is pulled in the opposite direction from that caused by the biasing spring, i.e. it should be pulled over to the "mark" position.

When using the GK.189B (12 V d.c.) or GK.189C (24 V d.c.) it may not be permissible to earth connections 9 and 6 (or 5) as they are connected to the positive side of the power supply which may not be earthed. In this case, connections 9 and 6 (or 5) of the keyer/converter, and the tongue contact of the teleprinter send relay, should merely be joined together and not to earth.

When the send contacts of the teleprinter are in the space condition, connections 8 and 9 on the GK.189 are shorted (possibly via some filter elements) and the tone sender changes from mark to space frequency).

4.2 INITIAL ADJUSTMENTS

The A.F. Output level control should be set to give the required line level or transmitter modulation depth.

The output from the associated receiver or incoming line should be adjusted to give an input level of approximately 30 mA to the ron converter, as indicated on the built-in meter with the Meter switch in the INPUT LEVEL position.

The D.C. Output level control should be set to give the appropriate line current output from the tone converter as required to operate the teleprinter. This may be checked by the built-in meter with the Meter switch in the LINE CURRENT position.

5.0

MAINTENANCE

The reliability of the transistorised circuits employed, and the absence of moving parts, obviates the necessity for routine maintenance apart from normal precautions to ensure that both exterior and interior of the units are kept free from accumulations of dust or moisture by occasional cleaning with an air blower and dry rag, paying particular attention to switches, plugs and sockets. Ensure also that external connections are maintained in a sound condition.

In the event of breakdown or a deterioration of performance, the voltage test figures given in the Appendix will be of assistance in fault finding by experienced electronic engineers.

To ensure receiving the correct item, and to expedite delivery, when ordering spare and replacement parts please quote:-

(i) Type number of equipment, as shown on label.

(ii) Serial number of unit.

(iii) Circuit reference as shown on circuit diagram and full description of item.

Additional or alternative useful information is the number of the Circuit Drawing, or Components List number and sheet number, or as shown in Spares Schedules.

GK.189
(from Serial No. 65)

Appendix

VOLTAGE TEST FIGURES

General Test Conditions:-

(Unless otherwise stated under "Special Test Conditions").

Tone Sender Sense switch set to "+".
Mark/Space/Line selector set to LINE.
No input to either tone sender or tone converter.
VT1 cut off.
VT10/VT11 quiescent.

All readings with respect to positive (0 V) line.
Measurements taken with Avometer Model 8 on 10 V d.c. or 25 V d.c. range as appropriate.

Due to variations in the regulation characteristics of the different power units, different readings are obtained for the GK.189A and for the GK.189B and C.

Transistor	Special Test Conditions		Voltages D.C.					
			GK.189A			GK.189B and C		
			Base	Emitr.	Coltr.	Base	Emitr.	Coltr.
VT1			-2.1	-3.3	-10.8	-1.6	-2.6	-8.0
VT2			-3.6	-3.3	-3.4	-2.8	-2.6	-2.6
VT3	M/S/L selector set to MARK	L1 short circuited	-2.4	-2.3	-11.3	-1.7	-1.55	-8.7
		Oscillating	-2.3	-2.8	-10.7	-1.8	-2.1	-9.0
VT4	M/S/L selector set to MARK		-4.4	-4.3	-13.3	-3.2	-3.1	-10.4
VT5			-1.2	-0.85	-13.2	-1.0	-0.8	-10.8
VT6	Meter switch set to LINE CURRENT		-3.5	-3.4	-9.7	-2.7	-2.6	-8.0
VT7	No input to tone converter		-12.7	-12.6	-13.5			
	VT12 cut off		-11.2	-11.1	-11.6			
	VT12 bottomed		-2.8	-2.7	-13.2			
VT8	Connections 5 and 6 linked	VT10/VT11 quiescent	-1.6	-1.8	-1.8	-1.2	-1.4	-1.5
		VT10/VT11 oscillating (VT12 cut off)	+10.3	+10.6	+10.5	+8.2	+8.5	+8.4
VT9	D.C. Output Level control set to give approx. 25 mA	VT10/VT11 quiescent	-2.0	-1.8	-1.8	-1.6	-1.4	-1.5
		VT10/VT11 oscillating (VT12 cut off)	+11.2	+10.6	-2.1	+8.85	+8.5	-2.1
VT10 and VT11		Quiescent	+0.13	0	-16.3			
		Oscillating (VT12 cut off)	+1.9	0	-14.0			
VT12	No input to tone converter		0	0	-12.7			
	Cut off		+		-11.2			
	Bottomed		-		-2.8			
VT13			-1.9	-2.1	-9.2			
VT14			-9.2	-11.2	-16.5			

CIR. REF.	COMPONENT DESCRIPTION	REF. No.	VALUE	TOL. ± %	RATING	ISSUE
	CAPACITORS					
C1	Type A306	Hunts	.1 uF	20	250V	
C2	Type CE3/1	Plessey	30 uF	+100 - 20	6V	
C3	Type PF. Polystyrene	G.E.C.	.1 uF	2	125V	3
C4	Type PF. Polystyrene	G.E.C.	.06 uF	2	125V	
C5	Type A302 A	Hunts	.5 uF	10	150V	
C6	Type A302 A	Hunts	.5 uF	10	150V	4
C7	Type A302 A	Hunts	.5 uF	10	150V	
C8	Type A305	Hunts	.05 uF	20	250V	
C9	Type L28/1 List No.MEW17T	Hunts	25 uF	+ 100 - 20	12V	5
C10	Type L28/1 List No.MEW17T	Hunts	25 uF	+100 - 20	12V	
C11	Type L37/1 List No.MEF35T	Hunts	250 uF	+100 - 20	25V	
C12	Type PF. Polystyrene	G.E.C.	.06 uF	5	125V	
C13	Type PF. Polystyrene	G.E.C.	.06 uF	5	125V	
C14	Type PF. Polystyrene	G.E.C.	.15 uF	5	125V	
C15	Type A300	Hunts	.1 uF	20	150V	
C16	Type CE 3/1	Plessey	30 uF	+100 - 20	6V	
C17	Type A302	Hunts	.5 uF	20	150V	
C18	Type A302	Hunts	.5 uF	20	150V	
C19	Type PF. Polystyrene	G.E.C.	.04 uF	2	125V	
C20	Type PF. Polystyrene	G.E.C.	.04 uF	2	125V	
C21	Type B858	Hunts	.04 uF	20	150V	
C22	Type B858	Hunts	.04 uF	20	150V	
C23	Type B800	Hunts	.01 uF	20	150V	
C24	Type L28/1 List No.MEW31T	Hunts	50 uF	+100 - 20	25V	
C25	Type CE.132.AE	T.C.C.	100 uF	+100 - 20	6V	
C26	Type WP 45	Hunts	10 uF	20	150V	
C27	Type L37/1 List No.MEF35T	Hunts	250 uF	+100 - 20	25V	
C28	Type KB 57/T	Hunts	1000 uF	+ 50 - 20	25V	
C29	Type A301	Hunts	.25 uF	20	150V	
C30	Type A301	Hunts	.25 uF	20	150V	
C31	Type B808	Hunts	.03 uF	20	150V	
C32	Type PF. Polystyrene	G.E.C.	.096 uF	2	125V	
C33	Type CE 67 B	T.C.C.	8 uF	+ 50 - 25	15V	
C34. C36 to 47	Type K.7004/811	Erie	.01 uF	± 20	350V	
C35	Type L28/1 List No.MEW17T	Hunts	[illegible]	+100 - 20	12V	
C36	Type CE3/1	Plessey	[illegible]	+100 - 20	V	
C37	Type A300	Hunts	0.1 uF	20	150V	

DRAWN BY	DATE	ENGINEER	DATE	APPROVED BY	DATE
C.H.P.	2.5.60				

REDIFON LTD. LONDON	TITLE Two Tone Keyer/Converter GK.189 Ser.Nos. 65 onwards	SHEET 2 contd.	DWG.No. WD8/6164/S

CIR REF	COMPONENT DESCRIPTION	REF No.	VALUE	TOL ± %	RATING
	RESISTORS				
R1	Type BTS	Dubilier	4.7K Ω	10	
R2	Type BTS	Dubilier	1.5K Ω	10	
R3	Type BTS	Dubilier	3.3K Ω	10	
R4	Type BTS	Dubilier	3.3K Ω	10	
R5	Type BTS	Dubilier	8.2K Ω	10	
R6	Type BTS	Dubilier	8.2K Ω	10	
R7	Type BTS	Dubilier	3.3K Ω	10	
R8	Type BTS	Dubilier	1K Ω	10	
R9	Type BTS	Dubilier	12K Ω	10	
R10	Type BTS	Dubilier	12K Ω	10	
R11	Type BTS	Dubilier	2.2K Ω	10	
R12	Type 9	Erie	560Ω	10	
R13	Type BTS	Dubilier	47K Ω	10	
R14	Type BTS	Dubilier	1K Ω	10	
R15	Type BTS	Dubilier	10K Ω	10	
R16	Type BTS	Dubilier	1K Ω	10	
R17	Type BTS	Dubilier	4.7K Ω	10	
R18	Type BTS	Dubilier	10K Ω	10	
R19	Type BTS	Dubilier	18K Ω	10	
R20	Type BTS	Dubilier	270 Ω	10	
R21	Type BTS	Dubilier	1K Ω	10	
R22	Type BTS	Dubilier	1.2K Ω	10	
R23	Type BTS	Dubilier	1.2K Ω	10	
R24	Type BTS	Dubilier	2.2K Ω	10	
R25	Type BTS	Dubilier	47K Ω	10	
R26	Type BTS	Dubilier	4.7K Ω	10	
R27	Type BTS	Dubilier	1K Ω	10	
R28	Type BTS	Dubilier	8.2K Ω	10	
R29	Type BTS	Dubilier	1K Ω	10	
R30	Type BTS	Dubilier	22K Ω	10	
R31	Type BTS	Dubilier	1K Ω	10	
R32	Type BTS	Dubilier	1K Ω	10	
R33	Type BTS	Dubilier	1K Ω	10	
R34	Type BTS	Dubilier	22K Ω	10	
R35	Type BTS	Dubilier	22K Ω	10	
R36	Type BTS	Dubilier	1K Ω	10	
R37	Type BTS	Dubilier	4.7K Ω	10	

DRAWN BY	DATE	ENGINEER	DATE	APPROVED BY	DATE
C.H.P.	2.5.63				

REDIFON LTD LONDON	TITLE	SHEET	DWG. No.
	Two Tone Keyer/Converter CK.1896 Ser Nos. 65 onwards contd.	3	WDB/6164/S

ISSUE

REF	COMPONENT DESCRIPTION	REF No	VALUE	+%	RATING	ISSUE
	RESISTORS Contd.					
R38	Type BTS	Dubilier	2.2K Ω	10		3
R39	Type BTS	Dubilier	2.2K Ω	10		
R40	Type 9	Erie	6.8K Ω	10		
R41	Type BTS	Dubilier	5.6K Ω	10		4
R42	Type BTS	Dubilier	2.2K Ω	10		
R43	Type 9	Erie	68 Ω	10		
R44	Type BTS	Dubilier	2.2K Ω	10		5
R45	Type BTS	Dubilier	2.2K Ω	10		
R46	Type BTS	Dubilier	2.2K Ω	10		
R47	Type BTS	Dubilier	91 Ω	5		
R48						
R49	Meter Shunt Type WE	Turner	75 mA			
R50	Type BTS	Dubilier	2.2K Ω	10		
R51						
R52	Type 9	Erie	15 Ω	10		
R53	Type 9	Erie	56kΩ	10		
R54	Type BTS	Dubilier	1.5k Ω	10		
R55	Type BTS	Dubilier	4.7k Ω	10		
R56	Type BTS	Dubilier	1000 Ω	10		
	POTENTIOMETERS					
RV1	Type YN INV. LOG.	Dubilier	250K Ω	20		
RV2	Type CLR 7001/9 Linear.	Colvern	4K Ω	10		
	LAMPS					
LP1	Type MES		12 V		1.6W	
	TRANSFORMERS					
T1	To OP.8063/S					
T2	To 71/6164/S					
T3	To 72/6164/S					
T4	To OP.8063/S					
T5	To 73/6164/M					

DRAWN BY	DATE	ENGINEER	DATE	APPROVED BY	DATE
C.H.P.	8.5.68				

REDIFON LTD. LONDON.	TITLE	SHEET	DWG. No.
	Two Tone Keyer/Converter GK.189 Ser. Nos. 65 onwards	4 contd.	WD8/6164/S

CIR. REF.	COMPONENT DESCRIPTION	REF. No.	VALUE	TOL. ±%	RATING
	CHOKES				
L1	To 76/6164/S		20 mH	1	
L2	To 77/6164/S		169 mH	1	
L3	To OP.8245/S				
	SWITCHES				
S1	To OP.4929/M				
S2	DP. DT. Type 8373/B101	N.S.F.			
S3	DP. DT. Type 8373/B101	N.S.F.			
S4	DP. DT. Type 8373/B101	N.S.F.			
S5	DP. DT. Type 8373/B101	N.S.F.			
	METERS				
M1	To 9/OP.1331/S				
	RECTIFIERS				
MR1	Type OA81	Mullard			
MR2	Type OA81	Mullard			
MR3	Type OA81	Mullard			
MR4	Type OA81	Mullard			
MR5	Type GJ5M	B.T.H.			
MR6	Type GJ5M	B.T.H.			
MR7	Type OA81	Mullard			
MR8	Type OA5	Mullard			
MR9	Type OA5	Mullard			
MR10	Type OA5	Mullard			

ISSUE 2 3

DRAWN BY	DATE	ENGINEER	DATE	APPROVED BY	DATE
C.H.P.	2.5.60				

REDIFON LTD. LONDON	TITLE Two Tone Keyer/Converter GK.189 Ser. Nos. 65 onwards	SHEET 5 contd.	DWG. No. WD8/6164/S

CIR REF	COMPONENT DESCRIPTION.	REF No.	VALUE	TOL ±%	RATING	ISSUE
	TRANSISTORS					
VT1	Type OC.71	Mullard				2
VT2	Type OC.71	Mullard				
VT3	Type OC.71	Mullard				
VT4	Type OC.71	Mullard				3
VT5	Type OC.71	Mullard				
VT6	Type OC.71	Mullard				
VT7	Type OC.71	Mullard				
VT8	Type OC.76	Mullard				
VT9	Type OC.76	Mullard				
VT10	Type OC.35	Mullard				
VT11	Type OC.35	Mullard				
VT12	Type OC71	Mullard				
VT13	Type OC71	Mullard				
VT14	Type GET103	G.E.C.				
	JACKS					
JK1	Type P73	Igranic				
JK2	Type P73	Igranic				

DRAWN BY	DATE	ENGINEER	DATE	APPROVED BY	DATE
C.H.P.	2.5.60				

REDIFON LTD. LONDON	TITLE	SHEET	DWG. No.
	Two Tone Keyer/Converter GK.189 Ser.Nos. 65 onwards	6	WDB/6164/S

CIR REF	COMPONENT DESCRIPTION	REF No	VALUE	TOL ± %	RATING	ISSUE
	CAPACITORS					
C40	Type CE18C	T.C.C.	50 µF	- 20 + 50	25V	1
C41	Type CT/5428	DUBILIER.	1000 µF	- 20 + 50	25V	C T C
						2
	RESISTORS					
R60	Type 10	Erie	27 Ω	10	1W.	
R61	Type BTS	Dubilier	47 Ω	10	½W.	
R62	Type BTS	Dubilier	47 Ω	10	½W.	
R63	Type AW.3112	Welwyn	1K Ω	5	12W.	
R64	Type BTS	Dubilier	820 Ω	10	½W.	
R65	Type BTS	Dubilier	1K Ω	10	½W.	
R66	Type BTS	Dubilier	330 Ω	10	½W.	
R67	Type AW.3112	Welwyn	10 Ω	5	12W	
	VALVES					
V1	Type 75C1 (CV 4084)	Mullard				
	FUSES					
F1	Type L1055	Belling Lee	1.5 A			
F2	Type L1055	Belling Lee	1.5 A			
	PLUGS					
PL1	Type P2/MFS Cat. No. 313261	Painton				
	RECTIFIERS					
MR12	Type GJ4M	M.T.H.				

DRAWN BY	DATE	ENGINEER	DATE	APPROVED BY	DATE
C.H.F.	30.4.59.				30-4-59

REDIFON LTD LONDON	TITLE 24V D.C. P.U. for GK.1?9C.	SHEET 2 contd.	DWG No WD1/6167/S

CIR REF	COMPONENT DESCRIPTION.	REF No.	VALUE	TOL %	RATING	ISSUE
						1
	TRANSISTORS					
VT1	Type OC.76 with Heat Sink	Mullard				2
VT2	Type OC.35	Mullard				

DRAWN BY	DATE	ENGINEER	DATE	APPROVED BY	DATE
C.H.P.	30.4.59.			[signature]	30-4-59

REDIFON LTD. LONDON.	TITLE 24V D.C. P.U. for Gk.189.C.	SHEET 3	DWG.No. WD1/6167/S

S.W.12.08

CIR REF	COMPONENT DESCRIPTION.	REF No.	VALUE	TOL ± %	RATING	ISSUE
	CAPACITORS.					
						1
C40	Type CT/5428	DUBILIER,	1000 uF	- 20 + 50	25V	
						2
	RESISTORS.					
R60	Type 10	Erie	27 Ω	10	1W	
R61	Type BTS	Dubilier	47 Ω	10	1/2W	
R62	Type BTS	Dubilier	47 Ω	10	1/2W	
R63	Type AW.3112	Welwyn	1K Ω	5	12W	
	VALVES.					
V1	Type 75C1 (CV.4084)	Mullard.				
	FUSES.					
F1	Type L1055	Belling Lee	1.5 A			
F2	Type L1055	Belling Lee	1.5 A			
	PLUGS.					
PL1	Type P2/MFS. Cat.No.313261	Painton.				
	RECTIFIERS.					
MR12	Type GJ4M	B.T.H.				

DRAWN BY	DATE	ENGINEER	DATE	APPROVED BY	DATE
C.H.F.	3-3-59				

REDIFON LTD. LONDON	TITLE 12V D.C. P.U. for GK.189B.	SHEET 2	DWG.No. WD1/6166/S

CIR. REF.	COMPONENT DESCRIPTION.	REF No.	VALUE	TOL ± %	RATING	ISSUE
	CAPACITORS.					1
C40	Type L37/1 List MEF35T	Hunts	250 uF	-20 +100	25V	2
C41	Type KR.63.KZ.	Hunts	5000 uF	-20 +100	25V	
	RESISTORS.					
R60	Type BTA	Dubilier	680 Ω	10	1W	
R61	Type BTA	Dubilier	680 Ω	10	1W	
R62	Type BTA	Dubilier	15 Ω	10	1W	
R63	Type 10	Erie	27 Ω	10	1W	
R64	Type BTS	Dubilier	150 Ω	10	1/2W	
R65	Type BTS	Dubilier	82 Ω	10	1/2W	
R66	Type AW.3112	Welwyn	1K Ω	5	12W	
	VALVES.					
V1	Type 75C1 (CV.4084)	Mullard.				
	FUSES.					
F1	Type L1055	Belling Lee	F1 & F2 0.5 Amp for 230V.			
F2	Type L1055	Belling Lee	1.0 Amp for 110V			
	TRANSFORMERS.					
T.6.	To Spec. No. SR/T.2538					

DRAWN BY	DATE	ENGINEER	DATE	APPROVED BY	DATE
C.H.F.	3.3.59				

REDIFON LTD LONDON	TITLE A.C. POWER UNIT. for GK.189A.	SHEET 2 cont	DWG.No. WD1/6165/S

CIR REF	COMPONENT DESCRIPTION.	REF No.	VALUE	TOL %	RATING	ISSUE
	PLUGS.					1
PL1	Type CA1861 3 Pole Fixed.	Bulgin				
						2.
	RECTIFIERS.					
MR12	Type RS.30B	S.T.C.				
MR13	Type RS30B	S.T.C.				
MR14	Type GJ4M	B.T.H.				
MR15	Type GJ4M	B.T.H.				

DRAWN BY	DATE	ENGINEER	DATE	APPROVED BY	DATE
C.H.P.	3.3.59				

REDIFON LTD. LONDON	TITLE A.C. Power Unit for GK.189A.	SHEET 3	DWG.No. WD1/6165/S

APPROVED

TRACED

ENGINEER

DRAWN [illegible] 29.4.60.

KEYED INPUT

10 7 8 9

C.38 0·01
C.39 0·01
C.40 0·01
C.41 0·01

C1 ·1
R2 1·5K
R1 4·7K
MR1
R3 3·3K
MR2

R4 3·3K
R5 8·2K
R6 8·2K
R7 3·3K
VT1 OC71
VT2 OC71
R8 1K
R9 12K
C2 30
R10 12K
R50 2·2K
R52 15

S1
S
M
+ SENSE
- S2

C3 ·1
C32 ·096
·06
MR8
R53 56K
C33 8
L1
C5 ·5
C6 ·5

FOR SINGLE OR DOUBLE CURRENT KEYING USE 7 AND 9.
FOR RELAY CONTACT OPERATION JOIN 8 TO 10 AND USE 8 AND 9.

T2
C19 ·04
MR3
R34 22K
C21 ·04
R25 47K
T3
C20 ·04
R35 22K
C22 ·04
MR4

SENSE SWITCH
S3

R37 4·7K
VT7 OC71
VT12 OC71
C24 50
R36 1K
R38 2·2K

L3
C23 ·01

TONE INPUT (600Ω)
1
2
C.42 0·01
C.43 0·01
JK1
R23 1·2K
T4
C12 ·06
C13 ·06
C14 ·5
L2
R24 2·2K
VT5 OC71
R26 4·7K
R27 1K
C16 30
C37 ·1
C15 ·1
R28 8·2K
R29 1K
VT6 OC71
R32 1K
C17 ·5
MR7
R33 1K
C18 ·5
S4
M1
R30 22K
R31 1K
METER SWITCH

REDIFON LTD., LONDON

TITLE

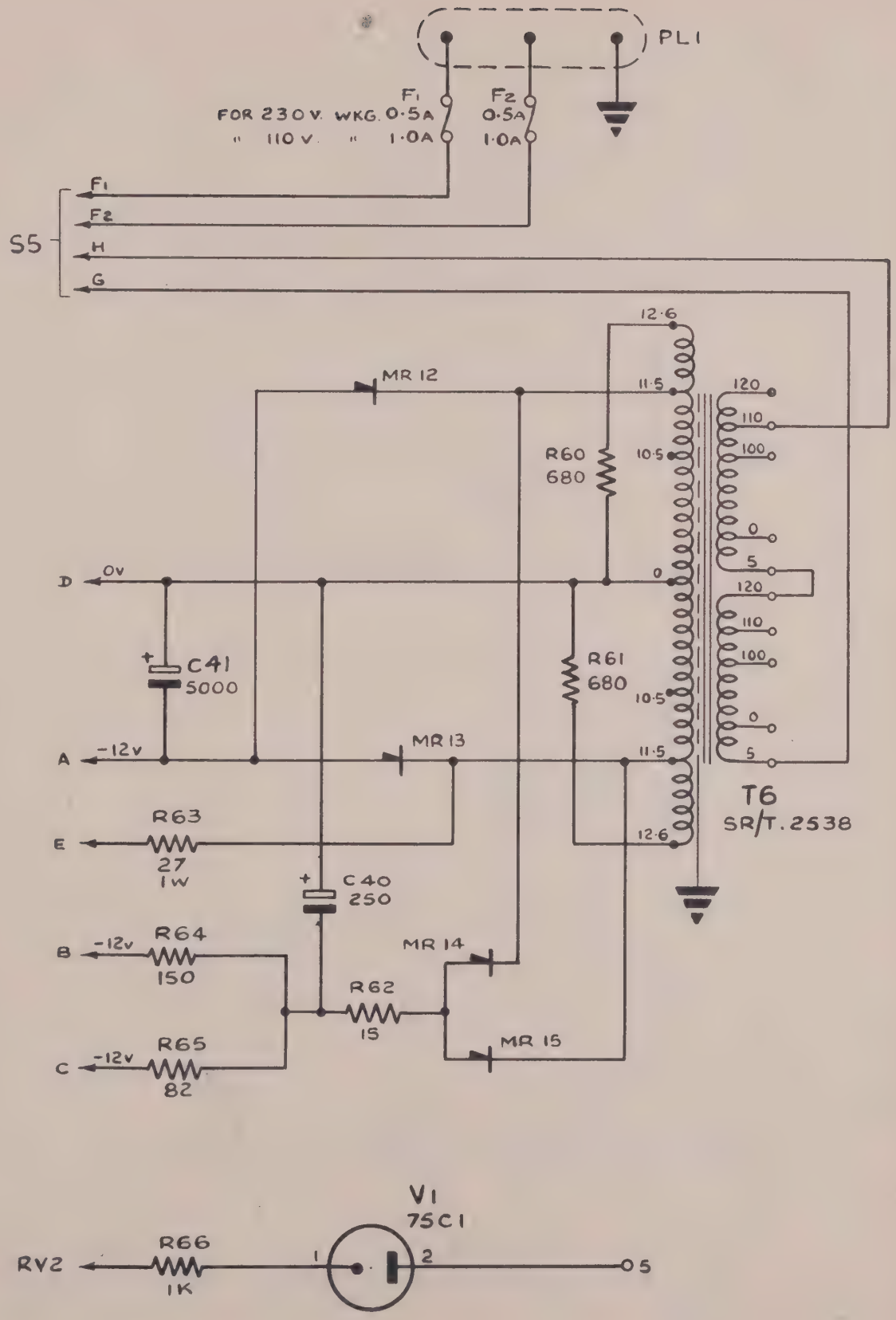
GK.189 TWO TONE KEYER / CONVERTER SER. Nos. 65 ONWARDS.

TONE SENDER.

C8 ·05
RV.1 ·25M
R13 47K
R14 1K
R12 560
VT3 OC71
R17 4·7K
T.1
R19 18K
VT4 OC71
C31 ·03
JK 2
R22 1·2K
PHONE SOCKET
C11 250
C.44 0·01
LINE OUTPUT (600Ω.)
3
4
-12v B
H
F_2
F_1
G
E
0v D
-12v C
-12v A
TO PU
S5
LP1
R11 2·2K
VT13 BASE
R15 10K
R16 1K
C9 25
R18 10K
R21 1K
C10 25
C.45 0·01
C.46 0·01
C.47 0·01
R55 4·7K
VT14 GET 103
R11
VT13 OC71
R54 1·5K
C36 30
R20 270
0V. (D).
R45 2·2K
C27 250
R46 2·2K
R40 6·8K
R41 5·6K
C26 10
VT9 OC76
VT12 OC35
VT11 OC35
C34 ·01
C29 ·25
C30 ·25
MR6
MR5
T_5
R49 75mA
RV.2 4K
PART OF P.U.
1K
75C1 CV.4084
R43 68
C25 100
R44 2·2K
R47 91
R56 1K.
C28 1000
MR9
MR10
C35 25.
0V. (D).
OUTPUT TO T/P
6
5
12
11

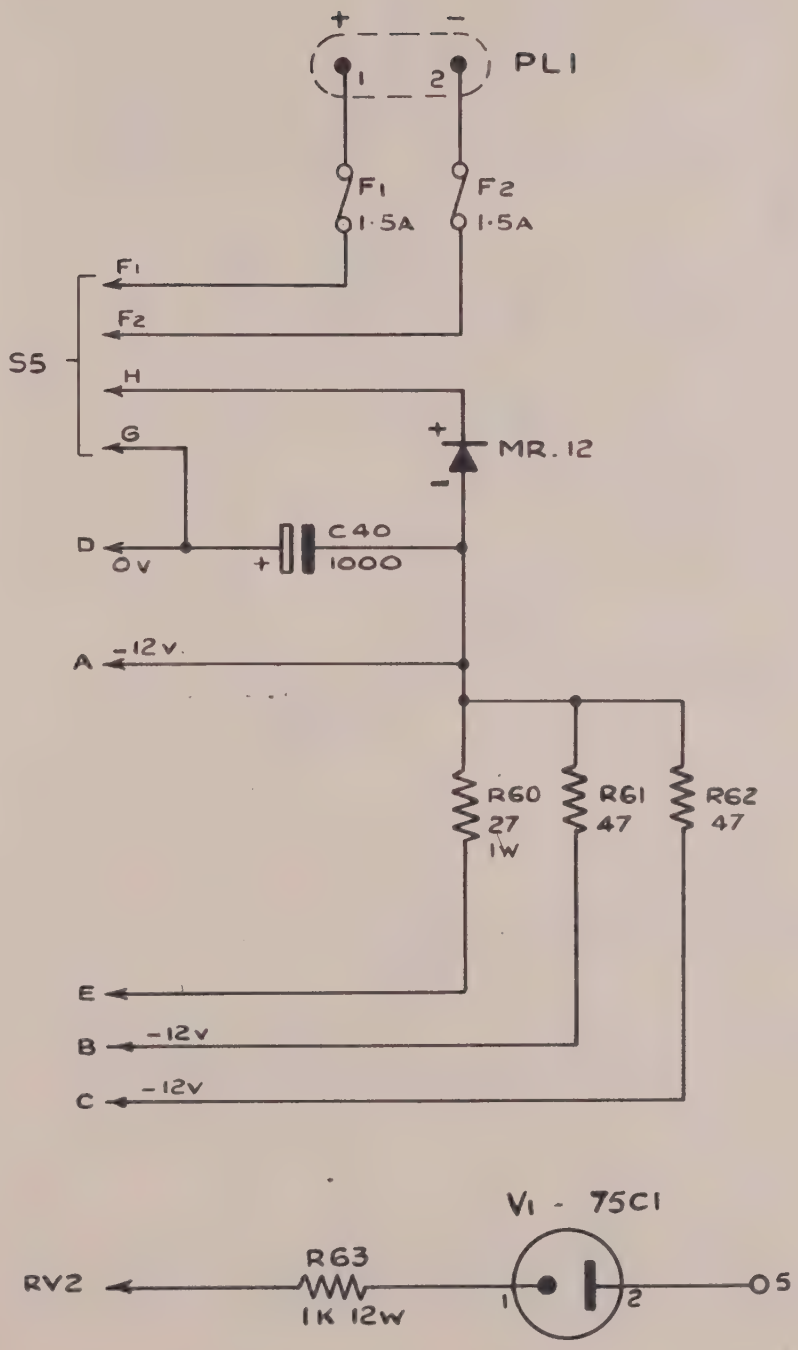
TONE CONVERTER.

DWG. No WDE 6164/M
SHEET 1



DRAWN U.C. 23·6·59 | TRACED | ENGINEER | APPROVED

REDIFON LTD LONDON	TITLE A.C. POWER UNIT FOR GK. 189 A	DWG. No. WD1/6165/S	SHEET 1



APPROVED

ENGINEER

23.6.59

TRACED UC.

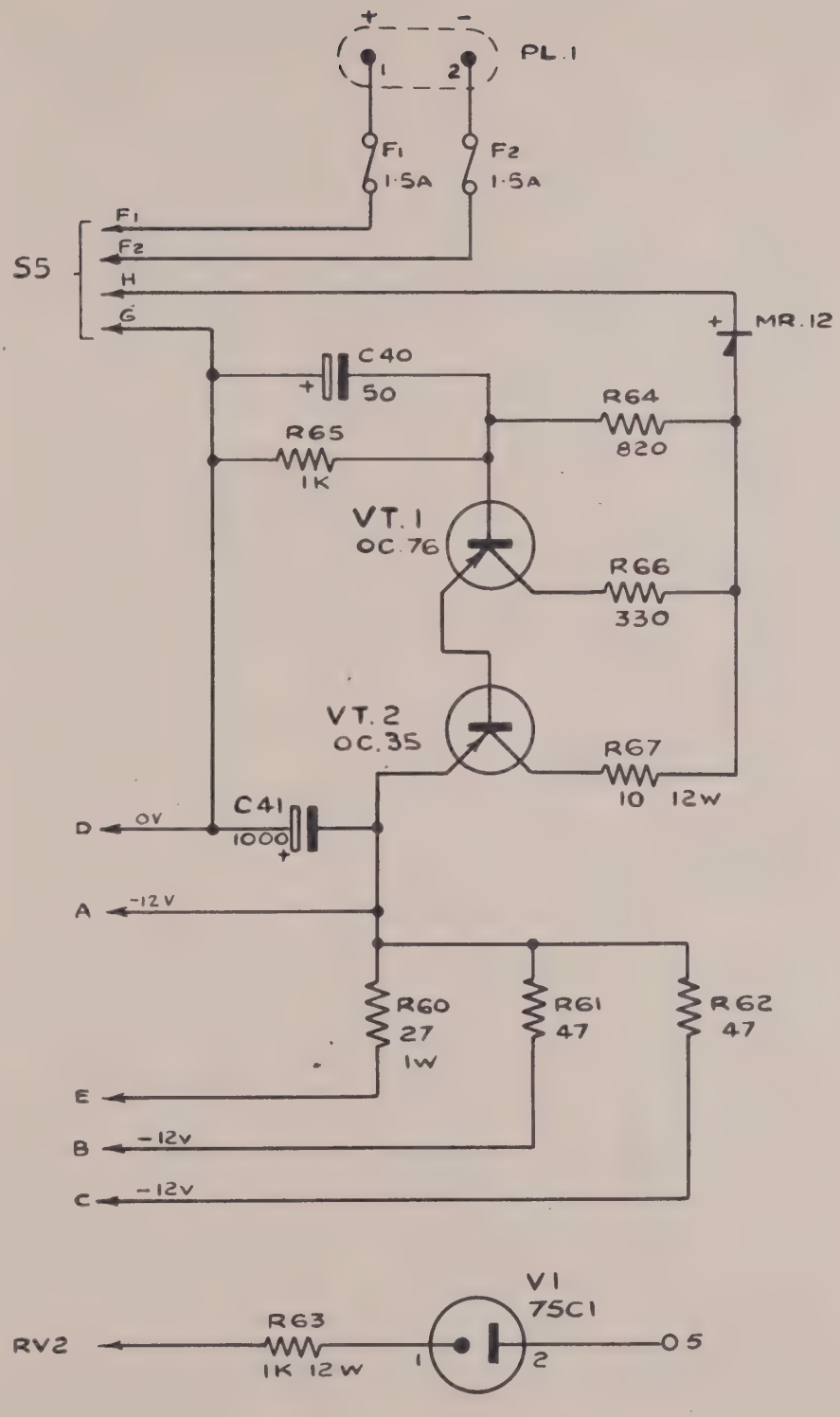
DRAWN

REDIFON LTD LONDON

TITLE 12 v. D.C. POWER UNIT FOR GK.189B

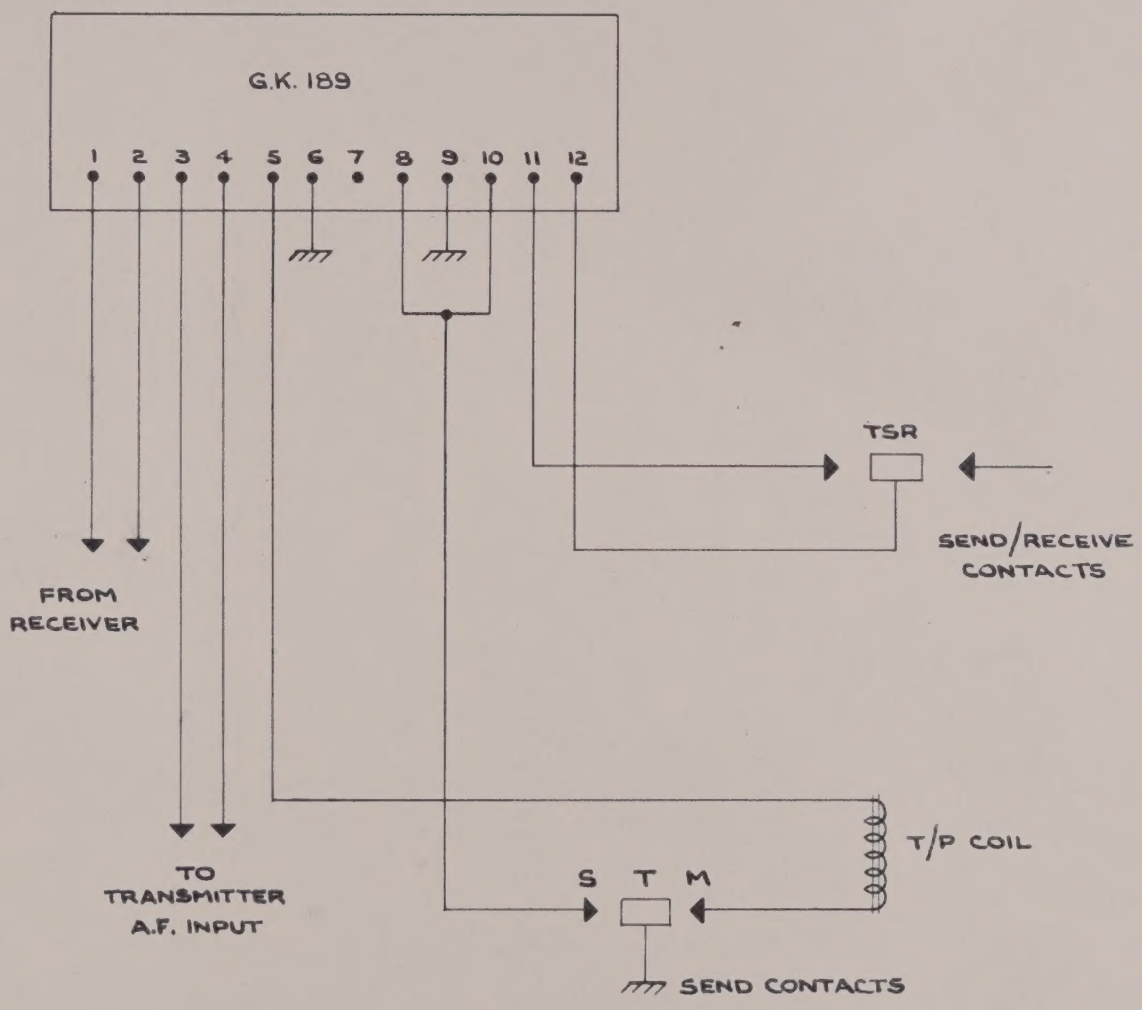
DWG. NO. WD1/6166/S

SHEET 1



DRAWN	REDIFON LTD. LONDON	TITLE 24v. DC. POWER UNIT FOR GK. 189C	DWG. No. WD1/6167/S	SHEET 1
TRACED UC. 24.6.59				
ENGINEER				
APPROVED				

ISSUE No. 2 3 4



APPROVED

ENGINEER

TRACED

DRAWN A.W.

REDIFON LTD. LONDON.	TITLE TELEPRINTER CONNECTIONS TO PROVIDE LOCAL RECORD – GK. 189	DWG. No. SK. 4192/S.	SHEET 1

MP MASTER
MA23862